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ABSTRACT

Two possible iconic models of the acquisition of verb agreement in American Sign Language (ASL) are developed and contrasted with a third, morphological account of the acquisition of this aspect of ASL. Additionally, data from spontaneous conversation of deaf children who have deaf parents are considered to test these three models. An iconic model of the acquisition of ASL assumes that the child is capable of making a direct comparison between the form of a sign and the form (or characteristic motion) of its referent. Furthermore, the ability to make this comparison facilitates comprehension or production of iconic signs. Either mime or spatial analogy may facilitate the acquisition of ASL verb agreement. Alternately, typological features may influence the acquisition of both signed and spoken morphologies. Predictions based on the three models were tested against longitudinal data from two deaf children of deaf parents. The subjects were each videotaped on a monthly basis, and detailed transcriptions were made of all contexts where the grammar of ASL required that a verb agree with the real-world location of an argument. All linguistic contexts which permitted optional agreement with a second argument also were examined. Age at which verb agreement was acquired, use of single-indexing and double-indexing, and the use of citation forms were assessed. The data indicate that the acquisition of verb agreement in ASL is neither early nor error-free. The data strongly support the morphological model: verb agreement was not acquired until after the third year, single-indexing was preferred, and the citation forms of verbs were used inappropriately before verb agreement was acquired. (SW)

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Icons and Morphemes: Models of the Acquisition of Verb Agreement in ASL[1]

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Much research on American Sign Language (ASL) has been guided by an interest in clarifying the role of iconicity in signing. We now know that ASL is not mime, but rather a language with a conventionalized grammar. ASL signs, although often quite iconic, are not transparent in meaning to naive hearing individuals (Klima and Bellugi 1979: 22-23) or to signers of other sign languages; furthermore, short-term memory for ASL signs is mediated by the formational properties of these signs, not by their iconic qualities (Klima and Bellugi 1979: 99-100). However, wit and poetry in ASL have been said to allow heightened use of iconicity (Klima and Bellugi 1979: 333). From the perspective of research in language acquisition, the iconicity present in ASL allows us to pose an interesting series of questions. Does the iconicity of many ASL signs aid the language learner's task? Is the acquisition of ASL as a first language more rapid than that of spoken languages because signs are frequently non-arbitrary in form?

Fischer (1973) and Newport (in press) have argued forcefully in favor of morphological models of language acquisition in ASL. However, Brown (1980) and Schwam (1980) have emphasized the importance of iconicity in sign acquisition, especially in lexical acquisition. On the basis of results from an experiment with hearing four year-olds, Brown (1980: 14) argued that "Iconic signs, when the iconicity can be recognized, will be more easily learned and remembered than arbitrary signs." The ASL signs in his experiment were all nouns. Brown (1980: 20) remarked that the iconicity of verb signs is "probably superior to that of nouns." If so, the facilitative effect which he claims for the iconicity of ASL nouns should prove even greater when we look at the acquisition of ASL verbs.

In this paper I will briefly develop two possible iconic models of the acquisition of verb agreement in ASL. In addition, I will contrast these two models with a third, morphological account of the acquisition of this aspect of ASL. Finally, I will present data from the spontaneous conversation of deaf children of deaf parents which will allow us to test these three models.

Description of verb agreement. Verb agreement in ASL, although once dismissed as pantomime, has since been considered to be an inflectional process (Klima and Bellugi 1979: 276). Regular changes in form are associated with predictable changes in meaning, as shown in Figure One[2]. Through changes in location, orientation, and/or direction of movement, verbs agree with the spatial loci, or "indices", of their noun arguments (Fischer and Gough 1978: 26-31). The referents of these arguments need not be present in the

conversational context. If they are not, the signer may establish abstract spatial loci for them. Verb agreement is not limited to motion verbs: ASK, LOOK, HATE, and others accept inflection. However, not all ASL verbs undergo agreement. Verbs articulated in contact with the body, such as EAT and THINK, do not permit agreement (Fischer and Gough 1978: 31).

Fig. 1 GIVE
Citation form — GIVE[I: 1 to 2] "I gave you" — GIVE[I: 2 to 1] "You gave me" — GIVE[I: 3j to 3i] "He gave him"

Verbs such as TELL and SEE can agree with only a single argument. However, many verbs, such as GIVE and LOOK-AT, may agree with the spatial loci of two arguments. Thus we find that both of the following sentences are grammatical:

1) Index[I: to 3i] GIVE[I: to 3j] BALL.
"He gave him the ball."

2) GIVE[I: 3i to 3j] BALL.
"He gave him the ball."

Of those verbs which permit both singly- and doubly-indexed forms, agreement with the agent noun is optional, whereas agreement with the object (in the case of GIVE, the indirect object) is required[3]. Thus, in (1) and (2), use of the uninflected "citation form" would be ungrammatical.

Let's look now at the iconic qualities of various inflected verbs. GIVE[I: 1 to 2] is a mime; KICK[I: 1 to 2] is not. GIVE[I: 1 to 2] is a reasonably accurate imitation of the action I would likely perform were I to give a small object to my addressee. KICK, because it uses the dominant arm as a symbol for the leg, is not a mime at all. A mime of kicking must involve use of the leg.

Note, moreover, that not all forms of GIVE are mimes. GIVE[I: 1 to 2] and GIVE[I: 1 to 3j] are, but the following forms are not: GIVE[I: 2 to 1] and GIVE[I: 3i to 3j]. Mime imitates an individual's actions from the perspective of that person. In contrast, GIVE[I: 3i to 3j] depicts an action from the vantage of someone other than the agent; the same is true for GIVE[I: 2 to 1]. If I wanted to mime the action referred to by the sign GIVE[I: 3i to 3j], I would somehow have to show that I had assumed the role of the agent. To do that, I might adopt a facial expression characteristic of that individual or I might change my position in space by moving to the left into the locus established for the agent.

This is not to say that forms such as GIVE[I: 2 to 1] are arbitrary signs. Rather, their iconicity may be considered to be of a different type than that of the various mimetic signs. I will distinguish two types of iconicity in ASL verbs of motion and transference: mime and what I call "spatial analogy". In spatial analogy, handshapes representing the moving object or body part traverse the sign space between spatial loci. This constellation of handshape, movement, and spatial loci form a rough mapping of the event to which the verb refers. Generally, doubly-indexed verbs of motion, transference, and position, including some mimetic forms of these verbs, analogically depict the motion and position of objects in space.

Models of the acquisition of verb agreement in ASL. An iconic model of the acquisition of ASL must assume that the child is capable of making a direct comparison between the form of a sign and the form (or characteristic motion) of its referent. It must then be hypothesized that the ability to make this comparison facilitates comprehension or production of iconic signs. Suppose we hypothesize that production of inflectable ASL verbs will be facilitated by either mime or spatial analogy. The two types of iconicity ought to aid acquisition of verb agreement in different ways and, accordingly, should engender two distinct patterns of performance.

Let's hypothesize first that mime facilitates the acquisition of ASL verb agreement. Were children to employ mime as a route into the system, we would expect that:

a) Children will make early use of verb agreement if the resulting verb form is a mime. So, for the sign GIVE, we would expect to observe early agreement with second- and third-person objects. We would be surprised to find agreement with first-person objects, as in GIVE[I: 2 to 1]. Such forms are not mimes. For the same reason, we would expect agreement to be employed only with "potentially mimetic verbs" (that is, verbs having at least one mimetic inflected form), such as GIVE and PUT; we would anticipate later acquisition of agreement both with non-mimetic motion verbs, such as CHASE and KICK, and with abstract verbs, such as HATE and ASK.
b) Double-indexing will be limited to first-person agents.
c) Citation forms will be used only if the adult form would require agreement with a first-person object. Use of the citation form would thus replace a non-mimetic form with a more mimetic one (although, as a consequence, the identity of the object would not be indicated by the verb itself.)

In contrast, if children are guided not by the mimetic properties of sign, but rather by the analogic use of space, we should encounter a dramatically different pattern in the acquisition data. We would expect the child to be capable at a very early age of portraying movements between two points in the real-world by analogous movements between corresponding points within the sign

space. We would predict that:

a) Children will display early use of verb agreement with verbs of motion and transference, including KICK and CHASE.
b) Children will show early mastery of double-indexing and will greatly favor such forms over singly-indexed verbs.
c) Children will not use the citation forms of analogic verbs inappropriately. The movements in such citation forms, as well as in their singly-indexed forms, are not analogues of the real-world events they describe.

This last model predicts that children will manifest early, correct usage of verb agreement with a large class of verbs and that children will be heavily biased toward using double-indexing, one of the two grammatical options which the adult language permits them.

To both these iconic models of the acquisition of verb agreement in ASL, we can oppose a more familiar morphological account. Much as in a spoken language, the various forms of a verb are related paradigmatically. Formationally, verb agreement consists of internal changes in the "phonological" shape of the verb; agreement of a verb with its noun arguments does not take place through affixation. Rather, these internal changes, articulated simultaneously with the verb stem itself, are the markers of agreement. These markers both identify the arguments and indicate its semantic and/or syntactic roles. Thus, in a verb such as HATE[I: 3i to 3j] no segmentable portions of the sign can be identified uniquely with either the verb stem or with the inflectional apparatus. In other words, we cannot segment an ASL verb into a string consisting of a stem and some number of phonologically-discrete affixes.

Recent work on the acquisition of spoken languages has suggested that the acquisition of inflectional morphology is strongly influenced by typological characteristics of the morphological system to which the child is exposed. A two-word stage lacking productive inflectional morphology appears not only in the acquisition of essentially analytic fixed word-order languages, such as English, but also in the acquisition of fused, inflecting languages with comparatively free word order such as Russian (Slobin 1968). This stage does not appear during the acquisition of such agglutinative languages as Turkish (Slobin, in press). The morphological structure of ASL suggests that we should not expect to find early error-free acquisition of verb agreement. Early acquisition of inflection has been found in languages such as Turkish in which there is typically a one-to-one mapping between form and meaning and in which the morphology is highly segmentable. ASL, however, is characterized by a one-to-many relationship between form and meaning. Agreement morphemes are not discrete, segmentable, stressable, or syllabic.

If we assume these typological features influence the acquisition of both signed and spoken morphologies, we would predict that:

a) Acquisition of verb agreement will be relatively late, as

in Russian and English child language.

b) Because singly-indexed verbs are morphologically-simpler than their doubly-indexed alternates, children will evince an early preference for single-indexing.

c) Before acquiring verb agreement, children will inappropriately use the citation forms of verbs.

Method. I have tested the predictions of these models against longitudinal data from two deaf children of deaf parents. The subjects were each videotaped on a monthly basis. I examined monthly videotapes of the spontaneous signing of Shirley (2;7-3;3) and Jane (3;1-3;6). Shirley was videotaped in a laboratory setting, while Jane was videotaped in her home. Detailed transcriptions were made of all contexts where the grammar of ASL required that a verb agree with the real-world location of an argument. I also examined all linguistic contexts which permitted optional agreement with a second argument. Because I am uninterested here in the ability of children to establish abstract spatial loci for non-present referents, I will not assess either child's use of verb agreement with such loci.

Results. To test the models developed above we must ask three questions of the data: 1) At what age is verb agreement acquired? 2) Do children prefer optional double-indexing over single-indexing? and, 3) Is acquisition of verb agreement preceded by use of citation forms in obligatory contexts for verb agreement and, if so, is the use of citation forms restricted as predicted by the mimetic model? My data are insufficient to determine whether verb agreement is, at the outset, restricted to the classes of verbs predicted by the two iconic models of acquisition.

1. Age of acquisition. The solid line in Figure Two indicates Shirley's use of obligatory agreement from 2;7 to 3;3. In the first sample, Shirley correctly used obligatory agreement in 70% of the contexts requiring it. However, if we adopt Cazden's (1968: 435) criterion of 90% correct usage of a grammatical morpheme in obligatory contexts in three successive samples, we would not credit Shirley with acquisition of obligatory verb agreement until 3;3. This finding replicates and extends upon Fischer's (1973) earlier work on Shirley's acquisition of verb agreement. Fischer, who sampled Shirley's sign at six-month intervals, determined that Shirley's acquisition of verb agreement was complete at age 3;6.

Loew (1980) and I have collected some preliminary data on Jane's acquisition of verb agreement. The data indicate that Jane had not attained Cazden's criterion by age 3;6.

These data suggest that verb agreement in ASL is not acquired until after the third year. Additional support for this contention comes from Hoffmeister (1978: 18, 23) who observed Alice, a deaf child of deaf parents. Before approximately 2;6, Alice did not produce any tokens of verb agreement. For the period from approximately 2;6-2;9, Hoffmeister's (1978: 37) data include two possible instances of verb agreement. Hoffmeister stresses that the major development in Alice's acquisition of verb agreement occurred in what he calls Stage II during which Alice was 3;1-3;3. Perusal of

Hoffmeister's (1978: 44, 47) data from Alice at this stage suggests that she continued to omit verb agreement on occasion.

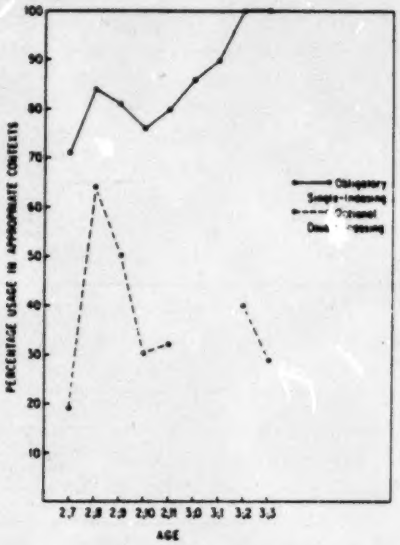

Fig. 2
One child's use of verb agreement in ASL

2. Optional double-indexing. The dashed line in Figure Two indicates Shirley's use of double-indexing from 2;7 to 3;3. As can be seen, the percentage of possible contexts in which a verb agreed with a second, optional index was much less than for obligatory agreement. In 71 cases, double-indexing, though permissable, does not appear. In 64 (90%) of these instances, the non-occurring doubly-indexed verb form would have been a spatial analogue. When double-indexing was employed, it was not limited in the fashion predicted by the mime model. Even at 2;7 and 2;8 Shirley produced "potentially mimetic verbs" which agreed with the spatial loci of second- and third-person agents.

3. Use of citation forms. Shirley erred in 40 of the 254 obligatory contexts for verb agreement which appear in the nine samples reported on here. Of these errors, 33 were errors of omission—in other words, Shirley employed a citation form verb in lieu of an inflected verb. 30 of these errors of omission were failures to inflect verbs, such as GIVE, which have both analogic and mimetic inflected forms. For example, at 2;7, Shirley, afraid that her mother would take some crayons away from her, repeatedly told her mother: NOT TAKE "Don't take." She failed to make TAKE agree with the location of the crayons despite the fact that the crayon box was lying on the table in front of her. The approriate adult forms of the verb would have been either TAKE[I: from crayons] or TAKE[I: crayons to 2].

Incorrect use of citation forms in contexts requiring inflected verbs has also been reported in Fischer (1973), Newport and Ashbrook (1977), and Hoffmeister (1978). Loew (1980) has found such errors in Jane's signing.

As mentioned above, 30 tokens were found in which Shirley inappropriately used the citation form of a "potentially mimetic

verb". The mime model predicted that children would incorrectly use the citation forms of such verbs only when agreement with a first-person object was required. However, in all 30 instances Shirley should have produced a verb which agreed with either a second- or third-person locus. In these instances, Shirley thus used a less mimetic verb form than required by the adult language.

Conclusions. The above data indicate that the acquisition of verb agreement in ASL is neither early nor error-free. Neither type of iconicity discussed here has an obvious facilitating effect. Contrary to the predictions of the spatial analogy model, we found no early preference for analogic double-indexing over non-analogic single-indexing. Nor do we find that incorrect use of citation forms is restricted to those linguistic environments predicted respectively by the mime and analogy models. Rather, the data strongly support the morphological model I sketched above.

In this paper, I have developed two distinct models predicated on the assumption that iconicity facilitates acquisition of verb agreement in ASL. The failure of those predictions of the iconic models which were evaluated here, in sharp contrast to the successful predictions made by the morphological model, buttresses earlier claims that the acquisition of ASL morphology by deaf children of deaf parents proceeds in a fashion quite similar to the acquisition of morphology in spoken languages. Moreover, I have argued that the same typological factors which appear to determine, in part, the acquisition of spoken language morphologies are also at work in the acquisition of morphology in ASL. The simultaneously-organized, non-discrete character of ASL morphology may be responsible for the relatively late, error-laden acquisition of verb agreement.

Notes

1. This work was supported by NIH Grant #NS15175 to Dr. Ursula Bellugi at The Salk Institute. This paper was presented at the Child Language Research Forum under the title "Two Models of the Acquisition of Verb Agreement in ASL." Figure One was drawn by Frank A. Paul. I would like to thank Edward Klima, Patricia Launer, Ruth Loew, Howard Poizner, and Michael Shand for their helpful comments.

2. I will employ the following notational conventions:

SIGN: an English label for an ASL sign.

'sign': the English gloss for an ASL sign.

Index[I: to x]: a pointing gesture, where 'x' is the location indicated by the point.

GIVE[I: x to y]: the superscripted material indicates that the verb agrees with, or "indexes", the spatial loci of 'x' and 'y'. The notation 'I: x to y' indicates that the verb moves from location 'x' to location 'y'.

1, 2, 3i, or 3j: first-, second-, or third-person loci. I will distinguish two third-person loci: '3i' on the left, and '3j' on the right.

I have arbitrarily chosen to translate all ASL verbs in the past tense in this paper. Tense is not marked on the verb in ASL.

3. I use the terms "agent" and "object" solely for ease of exposition.

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